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What is claimed is:

1. A singulation engine for singulating a substrate into a plurality of smaller component parts, the singulation engine comprising:

a gang manifold assembly including a manifold configured to distribute a slurry to a plurality of nozzles, each of the nozzles being configured to discharge an individual jet stream in the form of a beam for cutting through the substrate at the same time; and

a chuck assembly configured to hold and support the substrate and the smaller component parts formed therefrom before, during and after the jet stream cuts through the substrate.

2. The singulation engine as recited in claim 1 wherein the slurry includes an abrasive and water.

3. The singulation engine as recited in claim 1 wherein the smaller component parts correspond to ball grid array packages, QFN packages or photonic devices.

4. The singulation engine as recited in claim 1 further including a pump and a holding tank, the holding tank being configured to store and receive the slurry, the pump being configured to pump the slurry from the holding tank to the gang manifold.

5. The singulation engine as recited in claim 1 wherein the manifold and nozzles are configured to move in a linear manner order to provide a linear cutting path.

6. The singulation engine as recited in claim 1 wherein the chuck assembly includes one or more chucks, each chuck having a jet stream opening disposed therethrough for allowing the jet streams to pass after cutting through the substrate.

7. The singulation engine as recited in claim 6 wherein the chuck is an electrostatic chuck, a mechanical chuck or a vacuum chuck.

8. The singulation engine as recited in claim 6 wherein the chuck includes a vacuum platform and a vacuum manifold disposed underneath the vacuum platform, the vacuum platform being configured to receive the substrate and smaller component parts thereon, the vacuum platform including a plurality of vacuum openings, each of which is configured to apply a vacuum to the backside of the substrate and each of the smaller component parts formed therefrom, the vacuum manifold being configured to supply a vacuum to each of the openings so as to retain the substrate and each of the smaller component parts on the surface of the vacuum platform.

9. The singulation engine as recited in claim 1 wherein the chuck assembly includes a first chuck and a second chuck, the first chuck being configured to hold the substrate when the substrate is being cut by the jet streams in a first direction, the second chuck being configured to hold the substrate when the substrate is being cut by the jet streams in a second direction, the second direction being orthogonal to the first direction.

10. The singulation engine as recited in claim 1 wherein the gang manifold includes an inlet, a plurality of outlets, a slurry receiving channel and a plurality of slurry distribution channels, the plurality of slurry distribution channels being configured to receive the slurry from the inlet, and the plurality of slurry distribution channels being configured to distribute the slurry to the plurality of outlets, and wherein individual ones of the plurality of nozzles each are fluidly coupled to an individual outlet.

11. A vacuum chuck assembly configured to hold an unsingulated substrate and the singulated substrate parts cut therefrom before, during and after jet stream singulation, the vacuum chuck assembly comprising:

a first chuck configured to hold the substrate during x axis cutting, the first chuck including a plurality of vacuum passageways and a plurality of cutting slots, the vacuum passageways being configured to provide suction to the substrate in order to hold the substrate before, during and after jet stream singulation, the cutting slots providing a space through which a jet stream passes when cutting in a first direction; and

a second chuck configured to hold the substrate during y axis cutting, the second chuck including a plurality of vacuum passageways and a plurality of cutting slots, the vacuum passageways being configured to provide suction to the substrate in order to hold the substrate before, during and after jet stream singulation, the cutting slots providing a space through which a jet stream passes when cutting in a second direction that is orthogonal to the first direction.

12. The vacuum chuck assembly as recited in claim 11 wherein the singulated substrate parts correspond to ball grid array packages, QFN packages or photonic devices.

13. The vacuum chuck assembly as recited in claim 11 wherein each of the chucks includes a vacuum platform and a vacuum manifold disposed underneath the vacuum platform, the vacuum platform having a top surface on which the backside of the unsingulated substrate and the singulated substrate parts cut therefrom are placed before, during and after jet stream singulation, the vacuum platform including a plurality of vacuum openings each of which corresponds to one of the singulated substrate parts, the vacuum manifold including a plurality of vacuum channels that are fluidly coupled to the vacuum openings, the vacuum openings and the vacuum channels working together to form the vacuum passageways that distribute a suction force to the backside of the unsingulated substrate and the singulated substrate parts cut therefrom.

14. The vacuum chuck assembly as recited in claim 13 wherein the vacuum openings are disposed through the vacuum platform, and wherein the vacuum channels are recessed within the vacuum manifold.

15. The vacuum chuck assembly as recited in claim 13 wherein the cutting slots are formed by first slots disposed through the vacuum platform and second slots disposed through the vacuum manifold, the first and second slots being aligned with one another so as to form the cutting slots.

16. The vacuum chuck assembly as recited in claim 15 wherein the vacuum openings are positioned between the first slots, and wherein the vacuum channels are positioned underneath the vacuum openings between the second slots.

17. The vacuum chuck assembly as recited in claim 11 wherein the cutting slots of the first chuck are linearly positioned in the first direction, and wherein the cutting slots of the second chuck are linearly positioned in the second direction

18. The vacuum chuck assembly as recited in claim 11 wherein the vacuum openings are positioned in multiple rows and wherein there is a vacuum channel disposed underneath each row of vacuum openings.

19. The vacuum chuck assembly as recited in claim 11 further including a base configured support the chucks in their desired position relative to each other, the base including a pair of voids, one of the voids being positioned underneath the first chuck, another of the voids being positioned underneath the second chuck, the voids coinciding with the cutting slots, the voids providing a space through which the jet stream passes after traveling through the cutting slots.

20. The vacuum chuck assembly as recited in claim 11wherein the vacuum platform is formed from a rubberized material.

21. The vacuum chuck assembly as recited in claim 11 wherein the rubberized material is Viton.

22. The vacuum chuck assembly as recited in claim 11 wherein the vacuum openings include a recessed portion at the top surface of the vacuum platform and a through hole disposed underneath the recessed portion

23. A method of singulating a substrate having a plurality of integrated circuits formed thereon, the method comprising:

producing one or more jet streams in the form of a beam, the configuration of the jet streams being sufficient to cut the substrate;

directing the jet streams over the surface of the substrate; and

selectively operating the jet streams so as to cut the substrate into the plurality of integrated circuits.

24. The method as recited in claim 23 wherein selectively operating the jet stream includes performing a first set of linear cuts in a first direction.

25. The method as recited in claim 24 wherein during the first set of linear cuts, the jet stream is caused to move back and forth in the first direction while being incremented in a second direction at the end of each traverse, the second direction being orthogonal to the first direction.

26. The method as recited in claim 25 wherein the jet stream is moved at a first speed in the first direction and at a second speed in the second direction, the first speed allowing the jet stream to cut through the substrate, the second speed being faster than the first speed in order to prevent cuts through the substrate.

27. The method as recited in claim 26 wherein the ratio between the second speed and the first speed is between about 40:1 to about 5:1.

28. The method as recited in claim 24 wherein selectively operating the jet stream includes performing a second set of linear cuts in a second direction, the first direction being orthogonal to the second direction.

29. The method as recited in claim 28 wherein during the first set of linear cuts, the jet stream is caused to move back and forth in the first direction while being incremented in the second direction at the end of each traverse, and wherein during the second set of linear cuts, the jet stream is caused to move back and forth in the second direction while being incremented in the first direction at the end of each traverse.

30. The method as recited in claim 29 wherein during the first set of linear cuts the jet stream is moved at a first speed in the first direction and at a second speed in the second direction, and during the second set of linear cuts the jet stream is moved at a first speed in the second direction and at a second speed in the first direction, the first

speed allowing the jet stream to cut through the substrate, the second speed being faster than the first speed in order to prevent cuts through the substrate.

31. A method of separating a substrate into a plurality of integrated circuit chips, said substrate and said plurality of integrated circuit chips having a first side that is smoother than a second side, each of said plurality of integrated circuit chips including an array of contacts at said second side, said method comprising:

providing a vacuum platform having a plurality of vacuum openings, each of said vacuum openings corresponding to individual ones of said plurality of integrated circuit chips, each of said vacuum openings being surrounded by an upper surface of the vacuum platform;

disposing said first side of said substrate on said upper surface of said vacuum platform;

holding said first side of said substrate against said upper surface of said vacuum platform with a vacuum; and

cutting said substrate into the plurality of integrated circuit chips while said substrate is held against said upper surface of said vacuum platform, said cutting being performed by a jet stream formed into a beam.

32. A process of making an integrated circuit, comprising:

producing one or more jet streams in the form of a beam, the configuration of the jet streams being sufficient to cut a substrate, the substrate having a plurality of integrated circuits formed thereon;

directing the jet streams over the surface of the substrate; and

selectively operating the jet streams so as to cut the substrate into the plurality of integrated circuits.

33. A wet slurry filter arrangement, comprising:

a plurality of filter elements layered one on top of the other, each filter element including a container and a filter that separates the container into first and second chambers, the filter is configured to allow good abrasive material to flow from the first chamber into the second chamber while preventing oversized abrasive material from flowing therethrough, each filter element including a used slurry inlet for receiving slurry that was previously used to cut through a substrate, the used slurry

inlet being located in the first chamber thereby allowing the used slurry to be introduced into the first chamber, each filter element including an oversized slurry outlet and a good slurry outlet, the oversized slurry outlet being located in the first chamber and the good slurry outlet being located in the second chamber, the outlets being positioned opposite the used slurry inlet.